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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,841	01/15/2004	Thomas Metzger	P03,0594	5085
26574	7590	05/05/2005	EXAMINER	
SCHIFF HARDIN, LLP PATENT DEPARTMENT 6600 SEARS TOWER CHICAGO, IL 60606-6473			SUMMONS, BARBARA	
			ART UNIT	PAPER NUMBER
			2817	

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/757,841	METZGER, THOMAS	
	Examiner	Art Unit	
	Barbara Summons	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-14 is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/15/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the structured layer" on line 9. There is insufficient antecedent basis for this limitation in the claim. Should "the structured layer" be - - the at least one high acoustic impedance layer - - (see e.g. the spec. at page 3, lines 12-14) since it appears to be the high acoustic impedance layers that are "structured". Also, plural "structures" are recited on line 9, but line 10 recites a single "the structure", and it appears that one of these should be changed to agree with the other.

For purposes of any art rejections that follow, a patterned high acoustic impedance layer with at least one structure enclosed by the uppermost low acoustic impedance layer will be considered to anticipate claim 1. It should be noted that the Examiner considers a "structured" layer to be the same as a "patterned" layer, which is a term more prevalent in the art.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 8 and 9 are rejected under 35 U.S.C. § 102(b) as being anticipated by Tikka et al. U.S. 6, 407,649.

Figs. 5, 9 and 11 of Tikka et al. disclose a component operating with bulk acoustic waves, the component comprising: a carrier substrate; a lower electrode (see Fig. 5) that faces the carrier substrate; an upper electrode; a piezoelectric layer arranged between the two electrodes; an acoustic mirror (other structure in Fig. 5 see also Fig. 9) arranged between the carrier substrate and the bottom electrode, the acoustic mirror comprising at least one layer of high acoustic impedance material being the metal mirror layers (Figs. 9 and 11) and at least one layer of low acoustic impedance material being the dielectric mirror layers, wherein the uppermost mirror layer is a low acoustic impedance dielectric layer [see 7) in Fig. 9]; wherein the uppermost mirror layer exhibits a varying thickness (see Fig. 11 where the 2nd dielectric is thicker in the middle than it is over the 2nd metallic mirror layer), the uppermost dielectric being planar to the lower electrode (Fig. 11); and wherein the high acoustic impedance metallic mirror layers are patterned (see col. 5, lines 52-57), and the uppermost 2nd low acoustic impedance dielectric layer encloses a structure of the patterned 2nd high acoustic impedance metallic layer (Fig. 11) forming a seal surface covered by the structure of the 2nd high impedance metallic layer, the seal surface being formed between the uppermost 2nd low impedance dielectric layer and the 1st low acoustic impedance dielectric layer below the

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structured 2nd high acoustic impedance metallic layer. That is, Tikka et al. Fig. 11 is similar to Applicant's Fig. 3b as far as the uppermost low acoustic impedance layer and uppermost high acoustic impedance layers are concerned.

Regarding claim 2, Fig. 11 shows two high acoustic impedance patterned metallic mirror layers. Regarding claims 3 and 9, see col. 5, lines 36-40. Regarding claim 8, the Tx tuning layer and shunt tuner layer in Fig. 5 are disclosed as metals (see col. 5, line 58 to col. 6, line 2) such that it is essentially another layer of the electrode.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tikka et al. U.S. 6,407,649 taken in conjunction with Ella U.S. 5,872,493.

Tikka et al. discloses the invention as discussed above.

However, Tikka et al. does not explicitly disclose an additional piezoelectric layer and additional electrode (i.e. a stacked resonator filter).

Ella discloses that it is known to form stacked resonator filters on acoustic mirrors in the same manner as single piezoelectric layer resonator filters (see Fig. 8a vs. Fig. 13a).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the filter of Tikka et al. such that it would have been comprised of a stacked resonator filter, because such an obvious modification would have been the mere substitution of art recognized alternative piezoelectric resonator filter structures as suggested by Ella (Fig. 8a vs. Fig. 13a), or it would have been equally obvious to have patterned the metal high acoustic impedance layers under the stacked resonator filter of Ella, as taught by Tikka et al., because such an obvious modification would have provided the benefit of reduced parasitic capacitive coupling between resonators as explicitly suggested by Tikka et al. (col. 5, lines 52-57).

Allowable Subject Matter

7. Claims 10-14 are allowable over the prior art of record.
8. Claims 4, 6 and 7 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
9. The following is a statement of reasons for the indication of allowable subject matter:

Regarding independent claim 10, the prior art of record does not disclose or fairly suggest a method of making a component operating with bulk acoustic waves comprising each of the recited steps, and especially "thinning and planarizing the upper surface of the uppermost mirror layer".

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Aigner et al. U.S. 6,534,900 discloses a bulk acoustic wave resonator with an acoustic mirror having patterned high acoustic impedance layers 12a and 12b (see Fig. 3) embedded in the low acoustic impedance layer 11, but does not discuss the method of forming the internal patterned layers.

Metzger et al. published application U.S. 2003/0227357 discloses a multi-layer carrier substrate for bulk acoustic wave resonators (Fig. 1).

Aigner et al. DE 101 49 542 discloses a bulk acoustic wave resonator over an acoustic mirror with high acoustic impedance layers (120a-c in Fig. 2A) embedded in the low acoustic impedance layer 118, and with the piezoelectric layer being a multi-layer structure (106 and 108, 134 and 136 in Fig. 2A).

Panasik U.S. 6,441,703 discloses a low acoustic impedance layer 210 (Fig. 5) that varies in thickness, but no mirror layer is patterned (i.e. structured).

Lakin U.S. 6,107,721 discloses a bulk acoustic wave filter with a mirror layer having a varied thickness (see layer 52 at area 51 in Fig. 5) and wherein this layer may be the uppermost layer, but no mirror layer is patterned.

Lakin U.S. 6,720,844 and Poirier U.S. 3,568,108 each disclose bulk acoustic wave resonators stacked with coupling layers between them.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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May 1, 2005



**BARBARA SUMMONS
PRIMARY EXAMINER**